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Draft Generic Aging Lessons Learned (GALL) Report and Standard Review Plan (SRP) for Subsequent License Renewal (SLR)

Mechanical Aging Management Programs (AMPs)

Office of Nuclear Reactor Regulation
Division of License Renewal

April 26, 2016

Agenda

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Time	*Topic*
08:30AM - 08:45AM	Opening Remarks
08:45AM - 10:45AM	➢ Attachment 1: Issue No. 9 – Removal of Fouling Deposits (AMPs XI.M20, Open-Cycle Cooling Water System, and XI.M27, Fire Water System) ➢ Attachment 1: Issue No. 10 – Surface Exams for Aluminum (AMP XI.M36, External Surface Monitoring of Mechanical Components, and AMP XI.M38, Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components) ➢ Attachment 2: Comment Nos. 4-6 – Aluminum and Stainless Steel Cracking and Loss of Material ➢ Attachment 2: Comment No. 7 – Stainless Steel and Nickel Alloy in Treated Water ➢ Attachment 2: Comment No. 3 – Long-term Loss of Material ➢ Attachment 2: Comment No. 16 – Stainless Steel, Nickel Alloy, Copper Alloy in Air Indoor Environment ➢ Attachment 2: Comment Nos. 37-41 – Air Definitions and AMP XI.M24, Compressed Air Monitoring ➢ Attachment 4: AMP XI.M36 and AMP XI.M38 – Acceptance Criteria (Staff seeking clarification) ➢ Attachment 4: AMP XI.M32, One-Time Inspection – Reduction in Site Wide Inspections ➢ Attachment 4: AMP XI.M33, Selective Leaching – Reduction in Destructive Examinations ➢ Attachment 4: AMP XI.M42, Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks – Acceptance of Blisters and FSAR Supplement
10:45AM - 11:00AM	Break

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Time	***Topic***
11:00AM - 12:30PM	➢ Attachments 1, 2 and 3: Managing Aging Effects of PWR Vessel Internals for SLR (AMP XI.M16A)
12:30PM - 01:30PM	Lunch
01:30PM - 02:30PM	➢ Attachments 1 and 3: AMP X.M2, Neutron Fluence Monitoring ➢ Attachments 1 and 5: AMP XI.M31, Reactor Vessel Material Surveillance
02:30PM - 03:00PM	➢ Attachments 1 and 3: AMP XI.M5, Boiling Water Reactor Feedwater Nozzle ➢ Attachments 1 and 3: AMP XI.M7, Boiling Water Reactor Stress Corrosion Cracking ➢ Attachments 1 and 3: AMP XI.M11B, Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in Reactor Coolant Pressure Boundary Components (Pressurized Water Reactors Only)
03:00PM - 03:30PM	➢ Attachments 1 and 3: AMP XI.M18, Bolting Integrity

Attachment 1: Issue No. 9

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AMPs XI.M20 and XI.M27: Removal of Fouling Deposits

Industry Comment

When fouling is identified in Fire Water Systems, deposits are required to be removed regardless of flow test results or minimum wall exam results. In addition, Open Cycle Cooling Water System corrective actions require that fouling is also required to be removed.

Staff Response – Accepted with modification

Summary of Staff Recommendations

- XI.M20 and XI.M27: Statement removed from programs
- XI.M20: Modified existing sentence in "corrective actions": "If fouling is identified, the overall effect is evaluated for reduction of heat transfer, flow rates, corrosion, and (if applicable) chemical treatment effectiveness."
- XI.M27: Added to "corrective actions": "An evaluation is conducted to determine if deposits need to be removed to determine if loss of material has occurred."

Attachment 1: Issue No. 10

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Surface Exams for Aluminum and Stainless Steel (AMP XI.M36, XI.M38)

Industry Comment

Surface exams for aluminum and stainless cracking are not necessary. Cracking can be seen visually prior to loss of intended function. Additionally, surface exams for opportunistic inspections are overly burdensome. (XI.M38)

Staff Response – Partially Accepted

Summary of Staff Recommendations

- Three options to conduct inspections
  - Surface examinations [no change]
  - VT-1 for Code and non-Code items [change as a result of comment]
  - Plant-specific approach described in LRA [change as a result of comment]

Attachment 2: Comment Nos. 4 – 6

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Aluminum and Stainless Steel Cracking and Loss of Material

Staff Response – Not Accepted

Technical Basis

- Indoor air and condensation environment can be aggressive
- Halides, principally from insulation
- Leakage from the component or nearby components
  - SRP-SLR A.1.2.1, leakage from bolted connections

Summary of Staff Recommendations – Overview of Further Evaluation

- Plant-specific OE search and one-time inspection [Supplement-related]
- GALL-SLR Report line items will cite specific AMPs (e.g., XI.M32, XI.M36, XI.M38) [change as a result of comment]
- AMP XI.M42 will be cited in the further evaluation [no change]

Attachment 2: Comment No. 7

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Stainless Steel and Nickel Alloy in Treated Water

Staff Response – Partially Accepted

Technical Basis

- If oxygen concentration is greater than 100 ppb, halogens greater than 150 ppb, and there is stagnant or low flow, loss of material due to pitting and crevice corrosion “is a concern”
- If the pH is less than 10.5 and temperature is less than 99 °C [210 °F], loss of material due to MIC is a concern
- Periodic inspections should be conducted to detect

Summary of Staff Recommendations

- AMR line items will cite specific AMPs [change as a result of comment]
- AMR line items will be established that cite 3.1.2.2.19 [change as a result of comment]

Attachment 2: Comment No. 3

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Long-term Loss of Material – Affects AMP XI.M32

Staff Response – Not Accepted

Technical Basis

- Loss of material and long-term loss of material are two different aging effects
- Wall thickness measurements to confirm adequate wall thickness.
- Representative sample once in the 50th to 60th year [change as a result of comment]
- Due to the potential for uniform loss of material it may not be possible to detect long-term loss of material with visual techniques
- No other balance of plant programs exclusively recommend wall thickness measurements

Attachment 2: Comment No. 16

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Stainless Steel, Nickel Alloy, Copper Alloy in Air-Indoor Environment

Staff Response – Partially Accepted

Technical Basis

- Indoor air can be deleterious to stainless steel and nickel alloy
- Based on industrial testing, copper alloy is not susceptible to significant loss of material in air and condensation environments

Summary of Staff Recommendations

- Stainless steel exposed to any air environment and condensation addressed in SLR Supplement [no change]
- Nickel alloy realigned to be consistent with stainless steel [change as a result of comment]
- Copper alloy – no aging effects when exposed to air, gas, or condensation environment [change as a result of comment]

Attachment 2: Comment Nos. 37 – 41

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Air definitions and AMP XI.M24

Staff Response – Accepted With Modification

Technical Basis

- Incorporating the environment associated with the dry air downstream of the air dryers into the term “gas” could result in confusion in relation to backup accumulators that are filled with gas
- Staff conducted an extensive review of all deleted terms and assigned new air environments. Basis for each change will be issued with the disposition of public comments document

Attachment 2: Comment Nos. 37 – 41

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Air definitions and AMP XI.M24, cont.

Summary of Staff Recommendations

- Revised air-dry (internal) to associate with air downstream of dryers (industry proposed gas)
- Deleted moist air, air with reactor coolant leakage, air with steam or water leakage, and air with metal temperature up to 288°C (550°F). Replaced with terms such as
  - Any environment – cyclic loading, fatigue, loss of preload
  - Any air environment – loss of material, cracking

Attachment 4: Comments on AMPs XI.M36 and XI.M38

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Acceptance criteria

Staff Response – Staff Seeks Further Clarification of Comment

Summary of Current Staff Position

- Staff established broad boundaries for acceptance criteria
  - Criteria results in corrective actions taken prior to loss of intended function
  - Criteria developed from plant-specific documents
  - Degradation projected until end of period of extended operation
  - Where practical criteria is quantitative [change as a result of comment]
  - Criteria clear enough for a singular decision

Desired Clarification

- Industry comments appear to direct the staff to be proscriptive

Attachment 4: Comments on AMP XI.M32

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Reduction in Site-wide Inspections

Staff Response – Not Accepted

Technical Basis

- One-time inspection is only conducted in the 10-year period prior to the subsequent period of extended operation
- The inspections for other AMPs that allow reduction in site-wide inspections are conducted periodically (e.g., AMP XI.M38, AMP XI.M42)

Attachment 4: Comments on AMP XI.M33

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Reduction in Destructive Examinations

Staff Response – Accepted With Modification

Technical Basis

- Industry recommended that in lieu of two destructive examinations, one would be conducted for material and environment populations less than 100 components
- Staff used existing three percent of the population as a basis to establish the limiting population size

Summary of Staff Recommendations

- Revised number of destructive examinations to one for material and environment populations less than 35 components [change as a result of comment]

Attachment 4: Comments on AMP XI.M42

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Acceptance of Blisters and FSAR Supplement

Staff Response – Partially Accepted

Technical Basis

- Adhesion testing for blisters is conducted only when acceptance criteria are not met
  - "size and frequency should not be increasing between inspections…"
- FSAR Supplement Description includes key aspects of AMP
  - Peeling, delamination, blistering, and spalling of concrete could cause downstream effects in addition to localized effects – specific details in UFSAR

Summary of Staff Recommendations

- Revised corrective action recommendation for blisters to clarify that it applies when acceptance criteria not met [change as a result of comment]

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BREAK

Attachment 1: Issue No. 1

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AMP XI.M16A: PWR Vessel Internals and AMR Line Items

Industry Comment

MRP-227 should be used as a starting point for aging management in the GALL-SLR AMP and associated AMRs.

Staff Response – Partially Accepted

Technical Basis

- Staff agrees that aging management programs for pressurized water reactor (PWR) vessel internals are living programs
- Assessment over an 80-year period may change the inspection criteria for some reactor vessel internal (RVI) components

Summary of Staff Recommendations – Overview of Further Evaluation

- Further evaluation with a gap analysis
- Staff agrees that a modified approach may be taken for aging management of effects in PWR RVI components

Attachment 3: Comments on AMP XI.M16A

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Industry Perspectives

- Inspection methodology in MRP-227-A is a living program that will be updated when revisions of the report are issued by EPRI
- Applicants should be allowed to use MRP-227-A as a starting point for the PWR RVI management AMPs
- Further evaluation under the SRP-SLR is not necessary
- Include AMP XI.M16A in the GALL-SLR Report (NUREG-2191)
- Use AMR line items for internals in LR-ISG-2011-04
- Allow commitment to submit updated AMP and AMR line items after the 80 year version of MRP-227 is approved by the staff

Attachment 3: Comments on AMP XI.M16A

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Preliminary Assessment of NEI Comments

- Staff agrees MRP-227-A may be used as a starting point for PWR Vessel Internals AMPs in subsequent license renewal applications
- Reassessment of aging effects, mechanisms, and other plant parameters, including those that are time-dependent, may change the primary (P), expansion (E), existing (X) and no additional measures (NAM) categories or the inspection criteria for some components
- Staff does not agree with industry's position that "further evaluation is unnecessary"
- Staff will not accept commitments for subsequent license renewal application PWR RVI AMPs, similar to what was done for early license renewal applications

Attachment 3: Comments on AMP XI.M16A

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Assessment of Comments

- Staff proposes to retain a modified form of AMP XI.M16A, PWR Vessel Internals, in NUREG-2191 (GALL-SLR)
  - FE will still be necessary under SRP-SLR Sections 3.1.2.2.9/3.1.3.2.9
  - ISG AMR line items for PWR RVI components in GALL Tables IV.B2, IV.B3, IV.B4 and in Table 3.1-1 of the SRP will be retained
  - ISG AMR lines items for all categories of components are subject to FE
  - FE Sections 3.1.2.2.9/3.1.3.2.9 will be modified to allow alternative basis that uses MRP-227-A as a starting point - gap analysis requested under the FE
  - FE section will still permit the option of proposing a plant-specific AMP using the new plant-specific AMR line items for internals
- SLR applicants may use a plant-specific gap analysis, or a generic gap analysis if developed by the industry and approved by the staff

Attachment 3: Comments on AMP XI.M16A

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Potential Gap Analysis Options

- Plant specific gap analysis options
  - Aging factors, such as plant-specific neutron fluence, design cycles, and environmental effects should be evaluated
  - Plant-specific projection bases that compare to applicable thresholds should be justified
  - Alternatively, plant-specific bases may be proposed that modify component categorizations to higher category levels or change inspection criteria for the components
  - Primary to expansion link relationships would need to be evaluated and justified

Attachment 3: Comments on AMP XI.M16A

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Potential Gap Analysis Options

- Generic gap analysis methodology proposed by EPRI or industry
  - Yet to be proposed by NEI, EPRI, or other industry organizations
  - Would need to cover RVI components designed by each of the NSSS vendors (Westinghouse, CE, and B&W)
  - Would need to be endorsed by the NRC

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LUNCH

Attachment 1: Issue No. 2

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AMP X.M2: Neutron Fluence Monitoring

Industry Comment

Reactor vessel internals fluence monitoring not required. MRP-227 and BWRVIP analyzed bounding fluence thresholds for selected degradation mechanisms that will be re-evaluated as part of the industry programs.

Staff Response – Not Accepted

- Bounding fluence thresholds may be good, but plant-specific evaluations have been needed
- The AMP is a recommended framework for performing fluence calculations for SLR
- Research underway to develop guidance for non-beltline fluence calculations

Technical Basis

- Plant-specific fluence calculations will likely be necessary to support AMPs XI.M9 and XI.M16A

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AMP XI.M31: Reactor Vessel Material Surveillance

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Appendix H to 10 CFR Part 50

Reactor Vessel Material Surveillance Program Requirements

Introduction: The purpose of the material surveillance program required by this appendix is to monitor changes in the fracture toughness properties of ferritic materials in the reactor vessel beltline region of light water nuclear power reactors which result from the exposure of these materials to neutron irradiation and the thermal environment.

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Attachment 1: Issue No. 6

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AMP XI.M31: Reactor Vessel Material Surveillance

Industry Comment

Reactor vessel surveillance capsule fluence between 1 and 1.25 of the SLR peak fluence is required even though some plants have tested a capsule that has a higher fluence higher than 1.25 and no capsules remain. Consistent with existing requirements, capsule fluence between 1 and 2 of peak SLR fluence should be allowed.

Staff Response – Accepted

Summary of Staff Recommendations

- LR: withdrawal and testing of a capsule 1-2 times projected peak vessel neutron fluence for the period of extended operation; capsules moved to storage before accumulating excessive levels of neutron fluence
- Revised to: the withdrawal and testing of a capsule with a neutron fluence between 1 and ~~1.25~~ 2 times the projected peak vessel neutron fluence for the subsequent period of extended operation

Attachment 1: Issue No. 7

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AMP XI.M31: Reactor Vessel Material Surveillance

Industry Comment

SLR & contingency reactor vessel surveillance capsules are required for plants that tested all capsules.

Recommend adding “if available” after “additional capsule.”

Staff Response

- First Comment: Clarification
- Second Comment: Accepted

Attachment 1: Issue No. 7

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AMP XI.M31: Reactor Vessel Material Surveillance

Summary of Staff Recommendations

- Standby capsules are not required
- Withdraw and additional surveillance capsule at 1-2 times the projected peak reactor vessel neutron fluence during the subsequent period of extended operation and test specimens
- Retain withdrawn and tested specimens
- "The surveillance program retains additional capsules, if available, within the reactor vessel…"

Attachment 5: Comments on AMP XI.M31

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Low Lead Factor

Industry Comment

A capsule holder may be located in a low lead factor region, therefore a capsule located in such a holder will not "lead" the vessel. Recommend adding in the Program Description "*typically* surveillance capsules receive equivalent neutron fluence exposures earlier than the inner surface of the reactor vessel."

Staff Response – Accepted

Summary of Staff Recommendations

- AMR line will be revised to add *typically*

Attachment 5: Comments on AMP XI.M31

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Lagging Lead Factor

Industry Comment

AMP XI.M31 assumes that surveillance capsules “lead” the peak pressure vessel fluence. Recent surveillance testing has shown that certain designs have capsules which “lag” the neutron fluence at the peak vessel location. Due to this, it is impossible for such plant to use their existing surveillance capsule specimens to evaluate future conditions of the pressure vessel embrittlement and specifically preclude the condition of achieve in a “fluence of between 1 and 1.25 times the peak reactor vessel wall neutron fluence projected at the end of the subsequent period of extended operation.”

Staff Response – Revising Text

Attachment 5: Comments on AMP XI.M31

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Lagging Lead Factor

Summary of Staff Recommendations

- Will revise description to include that the neutron fluence exposures surveillance capsules should cover the range of neutron fluence levels needed for vessel embrittlement calculations – i.e., ID for PWRs (PTS) and ¼T for BWRs (P-T Limits)

Attachment 5: Comments on AMP XI.M31

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Alternate Materials

Industry Comment

Surveillance programs designed at the time of vessel construction. Scope states, "Materials originally monitored within the licensee's existing 10 CFR Part 50, Appendix H materials surveillance program will continue to serve as the basis for the reactor vessel surveillance AMP unless safety considerations for the term of the subsequent period of extended operation would require the monitoring of additional or alternative materials." This provision for the need to monitor alternate materials is unnecessary and should be deleted.

Staff Response – Accepted

Attachment 5: Comments on AMP XI.M31

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Alternate Materials

Summary of Staff Recommendations

- Delete “originally” and “unless safety considerations for the term of the subsequent period of extended operation would require the monitoring of additional or alternative materials” from above
- Not requiring addition of new materials

Attachment 5: Comments on AMP XI.M31

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ASTM E185-82

Industry Comment

The surveillance program must comply with ASTM E185-82, as incorporated by reference in 10 CFR Part 50, Appendix H. GALL-SLR references E185 (as per Appendix H guidelines), Appendix H is being revised to recognize E2215 and E185.

Staff Response – Not Accepted

Summary of Staff Recommendations

- Technical basis for revision of Appendix H is under development
- GALL-SLR Report must be consistent with current rules, regulations

Attachment 5: Comments on AMP XI.M31

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ASTM E185

Industry Comment

Many programs were built to an earlier version of ASTM E185 and cannot practically comply with the ASTM E185-82 version.

10 CFR Part 50, Appendix H is being updated to reference the latest version of the applicable ASTM standards.

Staff Response

- First Comment: Accepted
- Second Comment: Not Accepted – Status of Appendix H revision

Attachment 5: Comments on AMP XI.M31

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ASTM E185

Summary of Staff Recommendation

- Clarify 10 CFR 50, Appendix H III(B)(1) The design . . . edition of ASTM E 185 that is current on the issue date of the ASME Code to which the reactor vessel was purchased. Later editions of ASTM E 185 may be used, but including only those editions through 1982. For each capsule withdrawal, the test procedures and reporting requirements must meet the requirements of ASTM E 185-82 to the extent practicable for the configuration of the specimens in the capsule.
- Status Update: 10 CFR Part 50, Appendix H revision

Attachment 5: Comments on AMP XI.M31

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Reconstituted Specimens

Industry Comment

Many plants will need to build reconstituted capsules for SLR to conform with GALL-SLR. It is recommended that the reconstituted capsules include base metal and weld materials and that HAZ specimens should not be required.

Staff Response – Working on compliance aspects

Summary of Staff Recommendations

- Agree with the technical merits of not requiring HAZ specimens
- HAZ specimens eliminated in ASTM E185-1994
- May require an exemption to Appendix H – Staff will try to preclude the need for an exemption

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Attachment 1: Issue No. 11

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AMP XI.M5: BWR Feedwater Nozzle

Industry Comment

NUREG-0619 should be sunset, AMP XI.M5, BWR Feedwater Nozzle retired

Staff Response – Not Accepted

Technical Basis

- AMP uses volumetric ISI, as augmented using an approved GE Report
- Volumetric non-destructive examination (NDE) qualification is done in accordance with performance demonstration initiative (PDI) criteria
- Inspection frequency depends on nozzle design
- GE Report includes appropriate coverage and inspection frequency bases not currently covered by ASME ISI requirements
- These criteria remain an important aspect of the AMP

Attachment 1: Issue No. 11

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AMP XI.M5: BWR Feedwater Nozzle

Summary of Staff Recommendations

- Retain modified AMP (Partially accepted industry's proposed changes)
- AMR items and AMP not subject to any further evaluation criteria

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Attachment 1: Issue No. 3

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AMP XI.M7: BWR Stress Corrosion Cracking

Industry Comment

Program scope of BWR Stress Corrosion Cracking Program revised the reactor coolant system temperature to 140 °F, which is no longer consistent with Generic Letter 88-01.

Staff Response – Accepted

Technical Basis

- The threshold temperature is changed to 200 °F, consistent with Generic Letter 88-01

Attachment 1: Issue No. 4

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AMP XI.M11B: Cracking of Nickel Alloy Components

Industry Comment

Baseline inspection of bottom mounted instrument (BMI) nozzles using a qualified volumetric examination method is required. The existing program of regular visual exams is sufficient.

Staff Response – Not Accepted

- The staff disagrees with this comment and similar comments

Technical Basis

- The domestic and foreign operating experience, including the recent 2013 BMI nozzle leakage event, indicates that PWSCC can occur in reactor vessel BMI nozzles and can cause a loss of intended function of the components (i.e., loss of reactor coolant pressure boundary integrity)

Attachment 1: Issue No. 4

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AMP XI.M11B: Cracking of Nickel Alloy Components

Technical Basis

- The comment regarding the sufficiency of the existing visual examination for aging management is aligned with the rationale that the aging effect can be detected before a potentially serious safety event (but after a loss of intended function).

- The staff's view is that the baseline volumetric examination is necessary to detect and manage the aging effect before a loss of intended function for the subsequent period of extended operation. The baseline inspection is also necessary to confirm that the aging effect is occurring as anticipated or is not significant.

Attachment 1: Issue No. 4

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AMP XI.M11B: Cracking of Nickel Alloy Components

Technical Basis

- EPRI Report 1013535, "Nondestructive Evaluation: Utility Support for BMI Demonstrations," October 2006, indicates that 12 plants have inspected Alloy 600 BMI nozzles with ultrasonic methods (as of 2006 since the findings at STP-1). The report also states that the NDE methods used were demonstrated in the EPRI MRP Alloy 600 BMI blind demonstration program.

- The staff's view is that the previous qualification activities (such as those descried above) can significantly reduce any additional efforts necessary to develop a qualified volumetric method that is capable of detecting PWSCC in BMI nozzles.

Attachment 1: Issue No. 5

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AMP XI.M11B: Cracking of Nickel Alloy Components

Industry Comment

Baseline inspection using a qualified volumetric method or inner diameter surface inspection of all susceptible nickel alloy branch line connections and welds, consistent with MRP-126 which is a 2004 document, is required. The existing program of regular visual exams is sufficient.

Staff Response – Not Accepted

- The staff disagrees with this comment and similar comments

Attachment 1: Issue No. 5

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AMP XI.M11B: Cracking of Nickel Alloy Components

Technical Basis

- Recent operating experience in RIS 2015-10 indicates that branch line connections and associated welds may have not been examined volumetrically. As RIS 2015-10 clarifies, volumetric examination of these components is included in ASME Code Case N-770-1 as incorporated by reference in 10 CFR 50.55a.

- The staff's view is that the baseline volumetric examination is necessary to confirm that PWSCC is not occurring in branch line connections given the possibility these components may not have been volumetrically examined for a relatively long period of time. Existing periodic volumetric inspections may be credited for this baseline inspection.

Attachment 3: Comments on AMP XI.M11B

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Industry Comment

Include consideration of the PWSCC temperature threshold when recommending baseline volumetric examinations for branch line connections and control rod drive mechanism (CRDM) housings that typically operate below the 550 ˚F threshold temperature.

Staff Response – Partially Accepted

Technical Basis

- The guidance is revised to indicate the threshold temperature for the baseline inspection of branch line connections is 525 °F, consistent with the minimum cold leg operating temperature identified in ASME Code Case N-770-1. A baseline inspection of CRDM housings is not included in the program; therefore, the comment is not applicable for CRDM housings.

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Attachment 1: Issue No. 8

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AMP XI.M18: Bolting Integrity

Industry Comment

Inspecting for surface discontinuities and imperfections, and clearances and physical displacement for signs of loose joints is overly prescriptive. Inspection for signs of leakage should be sufficient, especially for non-safety related bolting.

Staff Response – Not Accepted

- Staff disagrees with industry's position

Attachment 1: Issue No. 8

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AMP XI.M18: Bolting Integrity

Technical Basis

- GALL Revisions 1 & 2: "…bolting for safety-related pressure retaining components is inspected for leakage, loss of material, cracking, and loss of preload/loss of prestress. Bolting for other pressure retaining components is inspected for signs of leakage."
- GALL-SLR: "…bolting for safety-related pressure retaining components is inspected for leakage, surface discontinuities and imperfections, and clearances and physical displacements for signs of loose joints. Bolting for other pressure retaining components is inspected for signs of leakage."
- These activities are essentially consistent

Attachment 3: Comments on AMP XI.M18

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Industry Comment

Revise "parameters monitored or inspected": "Specifically, bolting for safety-related and non-safety related pressure retaining components is inspected for signs of leakage~~, surface discontinuities and imperfections, and clearances and physical displacements for signs of loose joints~~."

Staff Response – Partially Accepted

- Staff partially agrees with the suggested addition
- Staff disagrees with the suggested deletions

Technical Basis

- The suggested deletions would be interpreted as doing less examinations for SLR
- Reducing inspection to leakage only is contrary to existing guidance

Attachment 3: Comments on AMP XI.M18

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Summary of Staff Recommendations

- Clarified "parameters monitored or inspected": "Specifically, bolting for safety-related pressure retaining components is inspected for signs of leakage, surface discontinuities and imperfections, and clearances and physical displacements for signs of loose joints. Bolting for other pressure retaining components is inspected for signs of leakage."

- Did not delete text suggested by industry

Attachment 3: Comments on AMP XI.M18

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Industry Comment

UT examination of non-safety related bolting with unknown yield strength is not necessary.

If the UT examination of non-safety-related bolting with unknown yield strength is considered necessary by the NRC, then it is requested the wording be revised to clarify scope (for non-safety related bolting).

Staff Response – Partially Accepted

- Staff does not agree with industry's position that "UT examination of non-safety related bolting with unknown yield strength is not necessary"
- Staff agrees with proposed wording clarifications

Attachment 3: Comments on AMP XI.M18

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Technical Basis

- If applicants have a bolting material in a situation where it could be susceptible to an aging effect, and there is no basis to know whether the bolting material should be considered susceptible, the conservative approach should be taken

Summary of Staff Recommendations

- Added to "detection of aging effects": "For bolting with actual yield strength greater than or equal to 1,034 MPa [150 ksi] and bolting for which yield strength is unknown (regardless of code classification or size of bolting), volumetric examination in accordance to that of ASME Code Section XI, Table IWB-2500-1, Examination Category B-G-1, should be performed. Specified bolting materials (e.g., from design and procurement specifications or fabrication and vendor drawings) may be used to determine if the bolting is a high strength closure."

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Industry Comment

Little justification is provided to increase the inspection of bolts in locations that preclude detection of joint leakage beyond the requirement of bolt heads are inspected when accessible and bolt threads are inspected when joints are disassembled to require a minimum of in each ten years inspect a minimum of 20 percent of the population of bolts heads and threads per material and environment with a maximum of 25.

Provide alternative recommendations for when bolts of a specific material/environment grouping do not become available during maintenance for bolt thread inspection in a ten year period. This could be to: 1) consider pump and system performance as an indication of joint leakage, and 2) diver inspection of the submerged bolts.

Staff Response – Accepted

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Technical Basis

- Guidance was included for inspection of bolting in locations that would make detection of joint leakage impractical, such as in submerged environments
- These revisions were made in an effort to reduce the number of requests for additional information as a result of bolting in submerged environments

Summary of Staff Recommendations

- Added to "detection of aging effects": "If opportunistic maintenance activities do not provide access to 20 percent of the population (for a material/environment combination) up to a maximum of 25 bolt heads and threads over a 10-year period, then other activities such as diver inspections and pump performance may be considered."

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Industry Comment

Remove from "detection of aging effects": "Non-ASME Code inspections follow site procedures that include inspection parameters for items such as lighting, distance offset, and cleaning processes that ensure an adequate examination."

Staff Response – Partially Accepted

Technical Basis

- Bolting does not need cleaning to verify there is no leakage
- Lighting, distance are basic inspection parameters that should be in place

Summary of Staff Recommendations

- Revised "detection of aging effects": "Non-ASME Code inspections follow site procedures that include inspection parameters for items such as lighting, distance offset, that ensure an adequate examination."

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QUESTIONS